

Estimating the Costs of VA Ambulatory Care

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This article reports how we matched Common Procedure Terminology (CPT) codes with Medicare payment rates and aggregate Veterans Affairs (VA) budget data to estimate the costs of every VA ambulatory encounter. Converting CPT codes to encounter-level costs was more complex than a simple match of Medicare reimbursements to CPT codes. About 40 percent of the CPT codes used in VA, representing about 20 percent of procedures, did not have a Medicare payment rate and required other cost estimates. Reconciling aggregated estimated costs to the VA budget allocations for outpatient care produced final VA cost estimates that were lower than projected Medicare reimbursements. The methods used to estimate costs for encounters could be replicated for other settings. They are

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potentially useful for any system that does not generate billing data, when CPT codes are simpler to collect than billing data, or when there is a need to standardize cost estimates across data sources.

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The Department of Veterans Affairs (VA) is one of the largest integrated health care providers in the United States. The VA has extensive utilization databases that use standard coding systems to record the care it provides. Because VA provides care without charge to most eligible veterans, it does not generate patient bills and, until the development of the Decision Support System, has not tried to allocate costs or charges to specific patient encounters. This article reports how the VA Health Economics Resource Center (HERC) used the Common Procedure Terminology (CPT) codes (4th ed.) to estimate the cost of every VA ambulatory care encounter.

The primary study objective was to assign costs to all VA outpatient encounters. For the most part, the methods described here could easily be applied to other studies or to other health systems. For example, there could be research projects with access to CPT code data, but the billing or cost information is not reliable or cannot be obtained without considerable effort. Another potential use is for studies with data collected from multiple systems with different cost estimates for the same CPT codes. These methods could be used to generate a standardized set of cost estimates. A third potential use is for analyses of billing information that reflects charges driven by market imbalances. If a research project needs estimates of actual or economic costs, not charges or payments, the analyst can adapt these methods to generate the necessary estimates.

This study relied on CPT codes, but CPT codes alone do not cover all possible provider services. To address this limitation, we also used the Health Care Financing Administration's Common Procedure Coding System (HCPCS), which was developed to cover medical supplies, devices, and specialized

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services not represented by a CPT code. For ease of notation, hereafter when we refer to CPT codes we mean both CPT and HCPCS codes, except where explicitly noted. Together, these two coding systems comprehensively cover provider and outpatient services.

Despite the use of CPT codes, there was no common set of non-VA payments or cost estimates for all CPT codes. Medicare had a payment rate for many services, yet there were many others that were not covered by Medicare, some of which were commonly used in the VA (e.g., provider consults by telephone). Thus, it was necessary to use multiple reimbursement schedules to establish a unified list of payments or costs for all CPT codes.

Some of the assumptions that we made for this study are appropriate only for the VA (e.g., our assumptions about the VA cost data). Others reflect limitations with the actual data and methods for matching ambiguous codes. We provide examples of some of the decisions that we made to assign a cost estimate to each CPT code used by VA in fiscal year 2000 (FY2000). These examples provide a framework for the logic of developing a comprehensive set of cost estimates for the CPT codes used in a specific setting. Extensive details and methods for FY1998 and FY1999 can be found elsewhere (Phibbs et al. 2001).

We scaled estimated payments to department-level VA costs to obtain cost estimates. To avoid confusion, we use the term *payments* to refer to provider charges or payment rates, including the relative value units used by Medicare. The term *costs* is reserved for payments adjusted to equal actual aggregate VA costs of providing care.

NEW CONTRIBUTION

There are two new contributions from this article. First, Medicare payment schedules do not include payments for all CPT codes. These exclusions can represent an important portion of the costs incurred by patients. We report on finding cost estimates for the excluded CPT codes. Second, we report on the methods we used to estimate costs for every VA outpatient encounter. One product from this work was a VA ambulatory cost database that can be linked to VA outpatient utilization data. We hope that this database facilitates economics and health services research by those using VA data. Detailed information on these data and how to access them are available in Phibbs et al. (2001). In addition, the lessons we learned could help guide future efforts to find cost estimates for all CPT codes used to measure the care received by groups of patients.

METHOD

DATA

Outpatient utilization data were obtained from the VA National Patient Care Data Outpatient Event file (Hynes, Joseph, and Pfeil 2002). VA cost data were obtained from the Cost Distribution Report (CDR). Because the CDR does not track clinic-specific costs, we aggregated the clinics into 13 categories of care that were consistent with the CDR cost distribution accounts. These 13 categories represent broad groups of similar clinics (e.g., all outpatient surgical clinics). Indirect costs reported in the CDR were then allocated to each category in proportion to the direct costs reported in the CDR.

Outpatient pharmacy costs were not included in this database because the pharmaceuticals provided by VA outpatient pharmacies are not reported in the Outpatient Event file. But, the Outpatient Event data do contain information (CPT codes) for pharmaceuticals dispensed during the encounter. Details on how to obtain data on VA outpatient pharmacy costs are described elsewhere in this issue (Smith and Joseph 2003). Prosthetics payments were estimated, but we did not scale these payments to VA costs because the Outpatient Event data does not record all prosthetics distributed by the VA.

MEDICARE RESOURCE-BASED RELATIVE VALUE SCALE (RBRVS)

We used Medicare payment rates as the primary source for relative values for CPT codes. Medicare provider payments cover not only physician services but include such items as laboratory tests, diagnostic imaging, and medical supplies. Medicare uses the RBRVS to calculate provider payments. RBRVS is based on detailed study of the economic costs of production (Hsiao et al. 1992). The RBRVS equalizes provider payments per unit of time, with adjustments for the amount of training required, associated stress, and practice costs for each service.

Under RBRVS, Medicare calculates payments in terms of relative value units (RVUs). Medicare issues a conversion factor that converts the RVUs to dollars. We used the 2000 Medicare RBRVS schedule as our primary source of RVUs. When 2000 Medicare RVUs were not available due to coding changes, we used Medicare RVUs from previous years. There are separate conversion factors for anesthesiologists and all other providers. The conversion factors used by Medicare are updated annually and are available from Medicare. For 2000, the conversion factors were \$17.77 for anesthesiology and \$36.61 for all

other providers. For some services, the reimbursement was not set by RVUs and conversion factors but was found in a separate Medicare fee schedule.

The Medicare RBRVS contains three components: physician work, practice expense, and malpractice expense. Medicare geographically adjusts all three components of the RBRVS payment. Given that we were primarily interested in estimating national VA costs, we did not employ these geographic adjustments. These geographic adjustments could be added to our methods for other applications. Also, the VA costs that we used do not include VA's malpractice expenses; this exclusion had a minimal effect on our estimates, as malpractice costs are a very small portion of total Medicare reimbursement.

When outpatient care is provided in a hospital-based clinic or other Medicare designated facility (e.g., ambulatory surgery center, emergency room, or skilled nursing facility), Medicare often reimburses the provider and the facility. When Medicare pays a facility, the physician practice expense is usually reduced. Since the vast majority of VA outpatient care is provided in settings that would qualify for Medicare facility payments, we used the facility-based practice expense and included facility payments in our estimates of costs. Although the payment to an office-based provider is usually greater than the payment to a facility-based provider, the facility receives a separate payment that usually exceeds this difference.

Medicare reimburses providers with a global payment for many procedures (e.g., surgery). This payment covers a bundle of services, such as preoperative care, procedures, and postoperative care. The payment is the same regardless of the number of pre- and postoperative visits. For procedures subject to global reimbursement, Medicare identifies what part of the reimbursement is for performing the procedure and what part is for all other covered services. Bundling payments reduces incentives to provide a larger bill for related services. Our goal was to develop VA cost estimates that reflected actual resource use. Thus, instead of using the Medicare global payment, we unbundled the services. For procedures that Medicare assigns a global payment, we used the payment for the procedure alone and assigned specific costs for each pre- and postoperative encounter. Thus, our estimates reflect variations in resource use associated with different numbers of pre- and postoperative visits.

GAP CODES AND OTHER FEE SCHEDULES

Many outpatient services provided by VA are benefits that are not covered by Medicare. Examples of these services include some preventive care and telephone contacts. We therefore supplemented the Medicare schedule with other payment methods. To the extent possible, we used sources of payment

data that were consistent with the Medicare payment methodology. The single most important source (17 percent of total CPT codes) of non-Medicare payment information was the Ingenix Corporation (Ingenix 2000), which has the RVUs that have been estimated by the private sector using the Medicare methodology. Because they fill important gaps in the Medicare fee schedule, these codes are often referred to as gap codes.

Some of the sources of payment information or RVUs included payments or RVUs for CPT codes that have Medicare RVUs. This overlap allowed us to rescale the data from other sources to be consistent with the Medicare RVUs. We were able to apply this method to data from the California Workmen's Compensation System (State of California 1999) and a survey of U.S. physicians (Wasserman 2000b). If overlaps were not available, we just used the payments without scaling them to Medicare RVUs. If the data were from a year besides 2000, we used the ratio of Medicare conversion factors to adjust for inflation. This method was applied to the data from the 1999 survey of the American Dental Association (2000), the 1999 survey data from the National Dental Advisory Service (Wasserman 2000a), and the average wholesale price of pharmaceuticals (Medical economics 2000).

COSTS FOR OTHER CPT CODES

We made a variety of other adjustments to obtain payments for CPT codes that were not matched to a payment by one of the above methods. Obsolete CPT codes were assigned the payment rates and RVUs of the replacement CPT code. CPT codes for services that can be done only on an inpatient basis were assumed to be coding errors and assigned an average payment for the clinic category. Some clinic visits by patients in VA long-term care facilities were coded as inpatient evaluation and management (E&M) services. These visits were assigned payments using time and complexity to match them to the corresponding outpatient E&M codes. Pediatric codes that had an adult equivalent were assigned the RVU of the adult code, for example, vaccines that have separate codes for pediatric and adult doses. Codes for pediatric and obstetric services not provided by VA were assigned the average VA payment per CPT code for the clinic category.

Each group of CPT codes includes a code for unlisted service or procedure. These codes are widely used by the VA. To estimate an RVU, we applied the weighted average payment for similar procedures. For example, we calculated the payment for unlisted hematology and coagulation procedures as the weighted mean payment of hematology and coagulation procedures actually performed by the VA.

We next reviewed any codes used by VA more than 100 times to try to identify a similar service with a payment rate. To check the validity of this matching to similar services with payment rates, we had at least one member of the HERC Clinical Advisory Panel review all matches. The remaining codes were assigned the national average payment per CPT code for each of the 12 categories of care we defined from the VA accounting data. Before assigning these average payments, each CPT code was reviewed to determine whether it was appropriate to assume that the service should be assigned the average payment. This review was done regardless of the number of times VA used the code, including codes used very infrequently. We considered whether these services were very expensive (e.g., custom, motorized wheelchair) or very inexpensive (e.g., a disposable syringe). When we deemed it inappropriate to assign an average payment to a service, we obtained a recommendation from a member of our clinician advisory panel about what constituted a similar service, and used the associated RVU.

MEDICARE AMBULATORY PAYMENT CLASSIFICATIONS

After developing an RVU for every CPT code, we identified the CPT codes that should be assigned a facility payment. Medicare adopted a new, prospective method of paying ambulatory care facilities in August 2000. This method assigns CPT codes to Ambulatory Payment Classifications (APC). A facility reimbursement was assigned to each APC. For services that were not covered by Medicare, we extended the Medicare method to estimate the appropriate facility payment.

Medicare assigned CPT codes representing similar services with similar facility costs to APC groups. Our primary sources of payment rates were the rules from 2000, the 1st year in which Medicare used the APC to calculate facility payments, and the new APC categories created for 2001. In general, when a visit involves several CPT codes, the facility receives an APC payment for each code. The exception is that APC payments for many surgical procedures are reduced by 50 percent unless the procedure is the largest APC payment for the visit.

Under the Medicare rules, many types of care are not eligible for facility payments. Procedures where the facility reimbursement comes from the APC payment for another CPT code do not receive a separate facility payment (e.g., facilities do not receive an APC payment for anesthesia CPT codes, since the anesthesia component of the facility payment is included in the APC associated with the procedure). Services covered by some specific Medicare fee schedules do not have a separate facility payment because the facility payment is included with provider reimbursement (e.g., laboratory tests, dialysis,

and medical supplies). Procedures that can be provided only in an inpatient setting are also not eligible for facility payments as these costs are covered by the inpatient hospital payment.

The VA provided many services that were not covered by Medicare and have not been assigned an APC. We first considered whether a facility payment was appropriate. If it was, we followed the methods we used for provider payments; for example, new CPT codes to replace obsolete codes and weighted averages for the unlisted procedures. We then considered if there was a similar procedure that had an APC payment. For example, Medicare reimburses facilities for some types of imaging tests but not others. When this occurred, we assigned the APC payment for the similar service and had a clinician review it. Codes that were assigned the average provider payment were also assigned the national average facility payment.

For services that could not be assigned a facility payment by these methods, we approximated one using the RBRVS practice expense payments for office-based providers. This included gap-code services and services characterized by codes that became obsolete by the time the APC system was implemented. We multiplied the office-based practice payment (the higher RVU payment for services provided in an office-based setting, as compared to a facility) by a factor that reflects the higher payments to facilities. We found this factor by comparing Medicare's APC facilities payments to the relevant office-based practice expense payments. We used the median ratio of these payments, 2.2, as our adjustment factor. The application of this method was limited to services that could be provided in office-based settings.

RECONCILIATION WITH VA ACCOUNTING COSTS

Once we had assigned provider and facility payments to each CPT code used by the VA, we applied them to all VA outpatient encounters. Within each category of care, we summed these estimated payments and compared them to the VA's reported costs from the CDR. The ratios of aggregate estimated payments to actual VA costs were used to scale the estimated payments so that our estimated costs within each category of care equaled the VA's actual costs for all care provided in each category. We refer to these estimates as our national cost estimates because the estimated costs for each procedure are uniform across all VA facilities.

Some VA researchers may need local, not national costs, so we created a second set of cost estimates using VA costs to account for geographic variations in production costs. To do this, we summed the national cost estimates for each VA facility and scaled them so that they equaled the total CDR outpatient costs at each facility. In using VA facility-specific costs to adjust for regional

variation, we have assumed that this is a better adjustment for regional cost variation for VA than the regional adjustment factors used by Medicare for wages, other practice costs, and malpractice costs. Conversely, using the costs at each local VA for regional adjustments means that they could also include facility-specific differences such as using different combinations on labor inputs to produce the same procedure. All three estimates (Medicare payment, VA national costs, and VA local costs) are available to researchers with access to the national VA computer center. Complete details on these data for each year and how VA researchers can access them are available in Phibbs et al. (2001).

ASSUMPTIONS MADE IN ASSIGNING COSTS TO CPT CODES

It was not possible to assign payments to all of the CPT codes used by VA without making a series of assumptions. The major assumptions included the following:

1. *All ambulatory care is comprehensively characterized by the CPT codes used in the national VA outpatient events database.* We assumed that the CPT codes recorded in VA outpatient databases accurately reflect the outpatient care VA actually provided and that no additional services were provided by VA. Implicit in this is the assumption that VA coding of CPT codes was the same as it was in Medicare so that the services represented by each CPT code are the same.

2. *All CPT codes used by VA represent a service that should be assigned a cost.* Many of the CPT codes used by VA would be rejected by third party payers in the private sector. For example, telephone care, follow-up surgical visits, and services assigned nonspecific procedure codes are not separately covered by Medicare. Rather than taking a payer's perspective, we assumed that every code used by VA represented a service that should be assigned a cost.

3. *Costs are proportionate to payment rates.* We assumed that VA cost of providing ambulatory care was proportionate to the estimated Medicare payment associated with each CPT code. We used Medicare reimbursement schedules, supplemented with selected private sector or other government reimbursement schedules for services not covered by Medicare.

4. *Some of Medicare's reimbursement methods were not appropriate for VA.* We calculated a national average Medicare payment, without applying geographic adjustments for local market wage differentials. We did not use the

Medicare established global payments for surgical services. Instead, we broke these down to a specific payment for each service covered by the global rate, (e.g., we found the separate payments for surgeries and follow-up visits). We assigned payments to services that would not be reimbursed separately by Medicare.

5. *Nonstandard service codes represent valid costs.* Some CPT codes used by VA are not normally used to prepare outpatient bills in the private sector. These include codes for procedures that are provided only to inpatients, codes that are obsolete, and codes that are not sufficiently specific to be accepted by third party payers. We assumed that these codes represent a service provided by VA. Due to insufficient data, we were forced to use assumptions to estimate the payments for this care.

6. *Payments should include facility payments.* Because most VA care is provided in a setting that meets the Medicare definition of a facility, we included facility payments. Medicare defines a facility as a hospital-based clinic, a skilled nursing facility, a freestanding surgery center, a comprehensive outpatient rehabilitation facility, or a community mental health center. This assumption increased the estimated payments and VA costs for those VA ambulatory care encounters provided in facilities that were not eligible for a facility payment. Note that this also assumes that the Medicare facility payments accurately reflect the facility costs incurred by VA.

7. *VA incurs the cost of ambulatory care reported in the CDR.* We used the CDR to adjust the resulting relative payments to VA total costs at the medical center and national levels. We assumed that outpatient care costs listed in the CDR were comprehensive and valid. To create our national cost estimates, we assumed that the total national cost of providing VA ambulatory care in each of 11 categories of care was as reported in the CDR. The same assumption was made for the local or medical center level aggregation.

8. *Indirect costs are incurred in proportion to direct costs.* We distributed the indirect cost of ambulatory care reported in the CDR to different types of ambulatory care. We used direct cost as the basis of this distribution.

9. *The CDR distribution of costs between inpatient and outpatient is accurate at each individual medical center.* To create our local cost estimates, we assumed that the total cost assigned to ambulatory care at each medical center was accurate. However, we did not assume that the cost reported in each category of care at each medical center was accurate. The local cost reflects national and local distribution of costs.

RESULTS

In FY2000, VA employed more than 9,000 different CPT codes to characterize more than 100 million services and procedures provided. Table 1 characterizes the VA outpatient care by the source of the HERC payment estimate. The 2000 Medicare RBRVS and Ingenix gap codes were the payment source for 77 percent of the CPT codes that accounted for 90 percent of the procedures and 85 percent of the estimated payments. In results not shown, we calculated that the Medicare RBRVS was accounted for 61 percent of the CPT codes representing 82 percent of the procedures and 77 percent of the estimated payments. Another 17 percent of the CPT codes used by VA were characterized by non-standard use of CPT codes; these accounted for 8 percent of the services provided, and 9 percent of the costs incurred by VA.

The bottom portion of Table 1 summarizes how we addressed the VA's use of nonstandard of CPT codes. It gives the number of VA services represented by nonstandard codes, the number of problem codes, and the total provider payment that we assigned to these codes. The relative importance of these problem codes depends on frequency of use. The Other Inpatient Codes was the most frequent type of coding problem in terms of number of codes, but they were rarely used. Thus, there was very little cost associated with this type of coding problem. Conversely, unlisted procedures codes are only about 9 percent of the nonstandard codes, but 60 percent of their occurrences and 40 percent of their costs.

Table 2 provides a breakdown of the different ways that CPT codes were matched to APC payments. Under the Medicare payment rules, surgical codes for a single encounter are subject to discounting; only the most expensive procedure is assigned full facility payment, and additional procedures receive half-payments. Although there were more codes subject to discounting than not, the codes that were not subject to discounting were used much more frequently. For FY2000, VA used 1,424 CPT codes with APCs that were not eligible for discounting for 43.7 million procedures, but used the 2,836 CPT codes that were eligible for discounting only 2.0 million times.

Given the types of services where facility payments are not appropriate (e.g., lab tests), there were many codes (3,572) with no APC-based amount, and they were heavily used (44,339,798 procedures). Of the CPT codes for which Medicare did not assign an APC-based facility payment, our use of gap code facility payments was the most common method to estimate an APC payment. This method was used for 171 CPT codes, representing 14,591,338 procedures.

Table 3 identifies the HERC estimated payments using Medicare payment rules and compares them with the VA CDR costs, by VA clinic category. As

TABLE 1 VA Utilization by Source of HERC Provider Payment Data (FY2000)

	Number of CPT Codes Used	Number of VA Outpatient Procedures	Total of Provider Payment (\$)
Source of payment			
Medicare 2000 RBRVS or Ingenix gap codes	7,223	96,346,965	3,178,538,771
Medicare RBRVS or Ingenix, other years	56	5,352	391,684
Other Medicare fee schedules	24	7,031	1,115,379
Dental charge surveys	440	2,385,223	199,833,497
California Worker's Compensation System	7	674	13,771
Physician charge surveys	10	245,960	12,201,892
Redbook	64	25,946	10,496,252
Nonstandard codes	1,579	8,229,765	350,594,550
Total	9,403	107,246,916	3,753,185,796
Resolution of coding problems			
Unlisted procedures	145	4,907,750	141,539,668
Obsolete codes	43	288,903	11,733,110
Inpatient E&M codes	32	162,299	6,043,538
Other inpatient codes	922	8,766	781,577
Pediatric codes changed to adult equivalent	32	75,539	757,042
Clinically similar code	144	1,315,495	24,502,288
Clinically similar payment	45	1,412,489	160,019,328
Pediatric/obstetric services not provided by VA	33	145	12,928
Remaining services assigned average payment	183	58,379	5,205,072

Note: VA = Veterans Affairs; HERC = Health Economics Resource Center; FY = fiscal year; CPT = Common Procedure Terminology; RBRVS = Resource-Based Relative Value scale; E&M = evaluation and management.

TABLE 2 Facility Component of Payment by Source (FY2000)

<i>Source of Payment</i>	<i>Number of CPT Codes Used by VA</i>	<i>Number of VA Outpatient Procedures</i>
Medicare 2000 APC payments subject to discounting	2,836	1,982,048
Medicare 2000 APC payment not subject to discounting	1,424	43,699,342
Codes with no APC payment	3,572	44,339,498
Matched to similar CPT code	107	387,898
Ingenix gap codes	171	14,591,338
Medicare 1997	18	2,771
Unlisted procedures	7	437,600
Obsolete codes	101	1,576,832
Inpatient E&M codes	32	162,299
Remaining services assigned average facility component of payment	1,138	67,290
Total	9,406	107,246,916

Note: FY = fiscal year; CPT = Common Procedure Terminology; VA = Veterans Affairs; APC = Ambulatory Payment Classifications; E&M = evaluation and management.

noted above, we did not estimate Medicare payments for services provided by the outpatient pharmacy or prosthetics categories of care, and these services account for about a third of all VA outpatient costs. In aggregate, for those categories we can match to utilization data, the VA's accounting costs were 24 percent lower than our estimated Medicare payments. As explained above, these estimates do not reflect actual Medicare reimbursement; we did not apply all of the Medicare payment rules, we assigned payments to services provided by the VA that Medicare does not cover, and we assumed facility payments for all VA facilities. The relationship between our estimated Medicare payments and the VA CDR costs varied considerably across the categories of care, with VA costs being much lower for all services except medicine, adult day care, and home care. The VA CDR costs were marginally lower than estimated Medicare payments for adult day care, marginally higher for medicine, and much higher for home care.

DISCUSSION

We used Medicare and other private sector payment rates as relative values to estimate the actual VA costs of outpatient care across patient encounters by CPT code. Although our estimates show that the VA's costs were 24 percent lower than estimated Medicare payments, the actual difference was almost certainly less due to some of the assumptions we made. We assigned costs to all services provided by the VA even though Medicare and other private sector insurers would not actually provide payment directly for at least some of these services. We also assumed that all VA outpatient encounters would be eligible for a Medicare facility payment, and facility payments accounted for almost half of our estimated payments. While we believe that most VA outpatient services would be eligible for a facility payment, we did not actually apply the Medicare rules to each VA facility. It is almost certain that some of the VA outpatient encounters do not qualify for facility payments. Because they were based on private sector charges instead of estimated costs or actual payments, it is also likely that our estimated dental payments are higher than they should be, as private sector charges almost always exceed costs and payments.

A careful comparison of VA costs and Medicare payments is beyond the scope of this study. A comprehensive review of the literature comparing VA and non-VA health care costs found that there was some indication that VA costs were lower than private sector charges, but that there was no conclusive evidence to support any differences in costs. This study also noted that institutional differences across systems made these comparisons difficult (Hendricks, Remler, and Prashker 1999). A recent VA study that looked in detail at the differences between VA costs and Medicare reimbursement for six

TABLE 3 VA Accounting (CDR) Costs and HERC Estimated Payments for VA Outpatient Services, by VA Clinic Category (FY2000) (in dollars)

<i>VA Clinic Category</i>	<i>VA Accounting Costs</i>	<i>HERC Estimated Total Payment</i>	<i>HERC Estimated Provider Payment</i>	<i>HERC Estimated Facility Payment</i>
Medicine	2,310,789,310	2,096,818,942	964,306,648	1,132,512,294
Dialysis	97,494,620	149,070,979	42,909,464	106,161,515
Ancillary services	195,494,112	313,859,001	141,721,333	172,137,668
Rehabilitation	264,348,590	359,648,194	196,917,655	162,730,539
Diagnostic	759,051,648	1,556,210,292	967,741,902	588,468,390
Surgery	758,737,263	998,079,173	413,704,973	584,374,200
Psychiatry	599,024,008	1,007,123,329	518,944,878	488,178,451
Substance abuse	182,696,246	318,600,112	134,941,218	183,658,894
Dental	186,487,626	315,035,797	264,660,192	50,375,605
Adult day	10,224,767	11,306,518	5,873,873	5,432,646
Home care	173,086,964	72,786,410	44,434,690	28,351,720
Pharmacy	2,652,165,809			
Prosthetics	265,552,185			
Total, excluding pharmacy and prosthetics	5,537,435,154	7,260,487,134	3,741,186,191	3,519,300,943

Note: VA = Veterans Affairs; CDR = Cost Distribution Report; HERC = Health Economics Resource Center; FY = fiscal year. Total VA accounting costs, including pharmacy and prosthetics, is \$8,455,153,148.

VA facilities reinforced these conclusions (Nugent and Hendricks 2003). Accurately determining if VA health care costs less than Medicare payments will require additional research.

Our estimates do not include the costs of outpatient pharmacy, which are almost one third of total VA outpatient costs. While it is possible to assign costs to the VA pharmacy benefits, they cannot be compared with Medicare payments as Medicare does not cover most outpatient pharmacy costs. While they are not included in our comparison of VA and Medicare, VA pharmacy costs are certainly lower than private sector costs as the VA pharmaceutical costs are among the lowest in the nation.

The estimates of prosthetics costs were limited to payments; we did not scale these payments to VA costs. The reason for this was that the prosthetics costs reported in the CDR greatly exceeded estimated payments, which clearly indicated incomplete data. Scaling the payments for the prosthetics that were reported in the Outpatient Event data would have caused significant overstatement of these costs for individual patients.

Table 3 shows that there is considerable variation across clinic categories in the differences between VA accounting costs and the HERC estimated payments. The largest relative differences were that VA costs were more than twice as large as HERC estimated payments for home care and that VA costs for the diagnostic category were about half as large as the HERC estimated payments. Furthermore, the VA costs for most of the other categories of care were much less than the HERC estimated payments. There were several factors besides actual differences in production costs that could contribute to these differences. First, the allocations of VA accounting costs could have errors in them; this could especially affect the estimates for smaller clinic categories, such as home care. Second, there was variation across clinic categories in the proportion of services provided that were covered by Medicare, and some of the payment assignments for non-Medicare services were less precise. Psychiatry, substance abuse, and home care were three of the clinic categories with proportionately more services not covered by Medicare.

The differences between VA accounting costs and the HERC estimated payments on Table 3 also indicate two limitations in the use of our VA cost estimates. First, our estimates are probably more accurate for the aggregate of all types of services used than they are for specific types of services. If a researcher is only using our VA cost estimates for a small subset of related services, the investigator should probably compare our cost estimates with other sources. A second caveat applies if one is looking at groups of patients that have large differences in the use of particular services, especially if those services are not eligible for Medicare payment. Conversely, these differences should not have

a measurable effect if one is looking at all health care utilization for large cohorts of patients.

Our results show that it is necessary to move beyond Medicare payments to obtain estimates of the relative costs of all outpatient provider services; failure to do so will result in missing data for a significant proportion of outpatient care. In VA in 2000, about 40 percent of the CPT codes, representing about 20 percent of the procedures and 25 percent of the payments, had CPT codes that did not have a Medicare payment. The Ingenix gap codes were an important data source, providing 17 percent of the codes and 8 percent of both the procedures and payments. While the exact proportions may vary across health care systems, it is likely that CPT codes that do not have established Medicare payments will represent a significant proportion of the care received by most cohorts of patients.

The extent to which other sources of cost or payment data need to be considered will vary by the source of the CPT code data and the study design. When the nature of the study requires greater precision of the cost estimates, more care is needed, and it is likely that more sources of cost or payment data will be needed. We found that a relatively small number of CPT codes provide payment information for most of the encounters that are not included in the Medicare and gap payment files. Since we used average payment values for those CPT codes we could not match to payments, we also carefully checked each CPT code to make sure that this was a reasonable assumption. Failing to make these checks would have little effect on the aggregate estimates for the entire VA or for large cohorts of patients, but they could easily lead to large errors in the estimated costs for individual patients.

As we have noted above, we made many assumptions in assigning costs to every VA encounter. Some of these assumptions had very little effect, while others were quite important. For example, our assumption that CPT codes for pediatric and obstetric services not covered by VA were coding errors had little impact, as these codes were used only 145 times (out of more than 100,000,000 procedures). Conversely, most encounters were affected by the assumptions that the RVUs for each CPT code were the same for VA and Medicare and that scaling these RVUs to VA accounting costs yields an accurate estimate of VA costs of providing each service. Our logic was that the Medicare RVUs are probably the best available estimate of the RVUs for each service and thus the best method of allocating VA costs across encounters.

We used large aggregations of VA outpatient care units to minimize the effects of accounting errors. We did not have the data to address the accuracy of the accounting data or if there were systematic differences in how VA records CPT codes compared to the private sector. Our estimates were also

affected by our assumption that costs should be assigned to every CPT code recorded in the VA outpatient data. We assumed that when a CPT code was recorded, some service was provided and costs were incurred.

Cost estimates from the VA's Decision Support System (DSS), the VA's implementation of a commercial hospital accounting system, may provide information on the accuracy of the CDR assignments of costs. Care must be taken in directly comparing our estimates of encounter level costs with those from the DSS; however, the DSS and CDR have different methods of allocating overhead costs, which can significantly affect the estimates (Finkler 1982). We also know that there are significant differences between the DSS and CDR in the number of encounters and in the total direct costs assigned to outpatient care (Yu and Barnett 2002).

In applying this approach to settings besides VA, there will undoubtedly be differences in some of the details and the relative magnitude of problems encountered. Some of these may be unique to the VA; about half of the uses of nonstandard codes were unlisted procedures codes. We know from follow-up with the VA Health Information Management Systems office that most unlisted procedures codes were due to incorrect coding of laboratory tests. This would not be an issue in a setting that was actually billing for these procedures, as payors would require the correct coding before processing the bills. In other systems where CPT codes are assigned but the CPT codes are not used for billing purposes, inconsistencies with billing rules are much more likely. While use of CPT code data that are used for processing payment should eliminate problems such as the use of unlisted procedures, obsolete codes, and the use of inpatient CPT codes for outpatient services, most of the other issues we encountered should apply to any source of CPT code data.

There are other issues that we did not need to consider that may be relevant for other uses of this method. For example, the VA CPT code data come from a single source from a very large health care system with a fair degree of top-down management. While there are almost certainly local variations in how encounters are assigned to CPT codes, the incentives that may influence coding are constant across the entire VA. This does not necessarily apply to data gathered from the U.S. health care system as a whole.

It is a reasonable conjecture that there are systematic differences in how encounters are assigned CPT codes in settings with different economic incentives. Consider the differences in the incentives for a physician assigning CPT codes for outpatient encounters between a physician in solo, fee-for-service practice, a physician in a small group practice, a physician in a large group practice, and a salaried physician working for a large HMO. While a standardized payment for each CPT code will solve the problem of different payments

or estimated costs for the same service across these very different types of providers, the investigator may need to look for systematic differences in CPT coding for similar services.

HERC will continue to create these estimates of the costs of all VA ambulatory care on an ongoing basis. Over time it is our intention to refine the methods outlined above, with a focus on limiting the use of provider charge surveys and the number of CPT codes that have to be matched to another code or assigned to a clinic type average cost. For example, for the 2001 estimates we have been able to identify Ingenix RVUs for most dental services, Medicare payments for many more types of durable medical equipment, and actual VA costs for many pharmaceuticals. It is also our intention to compare these estimates with cost estimates from the DSS. As we noted above, care must be taken in comparing cost estimates from both sources due to the differences in how the data were constructed. The ongoing improvements in the HERC estimates of the costs of VA outpatient encounters, and HERC's planned comparison of its cost estimates with those from VA DSS data as well, will result in better information on the costs of VA outpatient care. These efforts should make it easier for VA researchers to assign costs to outpatient care and have a better understanding of the reliability of these cost estimates.

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